CENTER FOR CANCER RESEARCH

Connecting the Cancer Community

Cancer Research in 21st Century

Director's Consumer Liaison Group-September 2011

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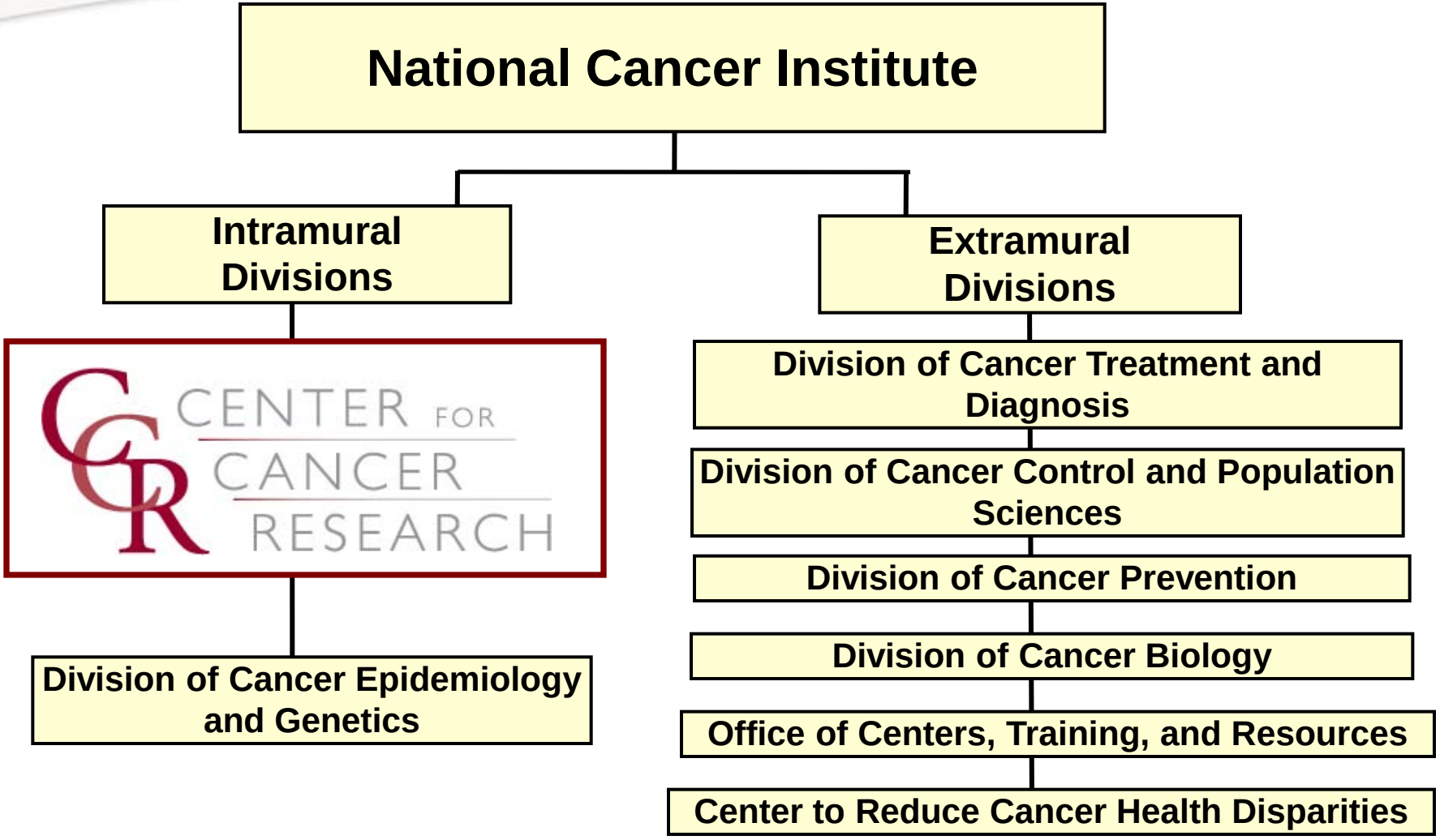
NATIONAL INSTITUTES OF HEALTH

NATIONAL CANCER INSTITUTE

CCR Is An Integral Part of NCI



CCR Vision

Integrate basic, translational, and clinical research to make cancer preventable, curable, or chronically manageable.

Shifting the Paradigm

Previous Approach	New Practices
Descriptive medicine	Understanding of disease mechanisms
Empirical diagnosis	Mechanism-based diagnosis/treatment
Grouped by organ site	Sub-grouped by molecular/biological classification
Uniform treatment	Individualized treatment
Retrospectively diagnose disease	Prospectively evaluate relative disease risk
Acute care	Early detection and intervention

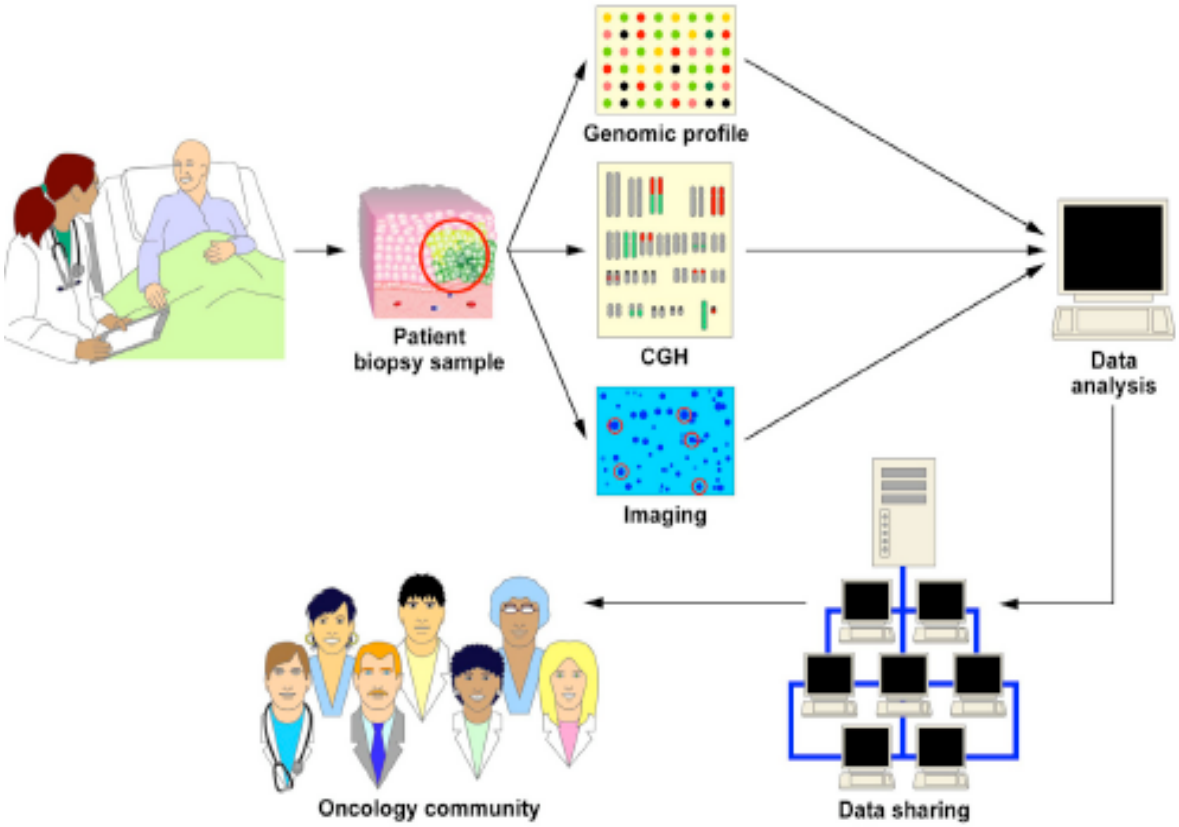
The NCI Intramural Clinical Research Program

- **The NCI intramural clinical program *is not* a large volume, full-service cancer center**

- **The NCI intramural clinical program *is* the largest cancer-focused clinical research center (CRC) in the world, capable of performing patient-intensive clinical research focused on developing new approaches for prevention, diagnosis, and treatment of cancer**

- **The NCI intramural clinical program is an important component of the nation's overall cancer program**

Seamless Movement from Lab to Clinic to Lab



Imaging is a Priority

- **Blur the line between imaging and pathology**
- **Develop novel imaging approaches and technology:**
  - Basic discovery research
  - Translational applications
  - Non-invasive patient care
- **Improve imaging techniques to enhance early detection, diagnosis, and treatment**
  - Preclinical model testing and validation
  - Clinical trial design and implementation
- **Develop novel imaging instrumentation**
- **Preemptive medicine**
  - Detect lesion
  - Determine pathway
  - Monitor for reactivation
  - Intervene upon re-activation, before gross tumor recurrence

Integrated Imaging

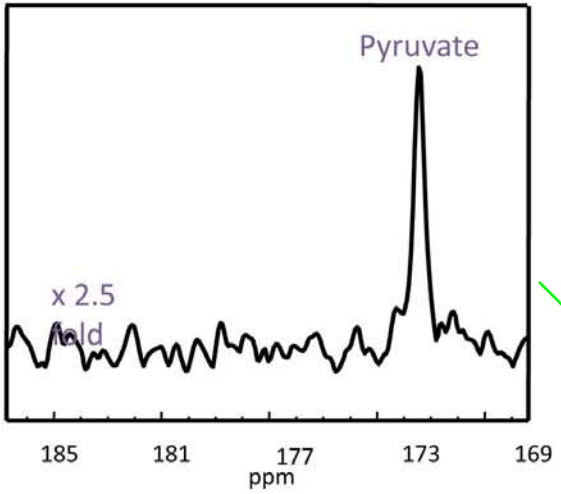
Goal: Preemptive Medicine

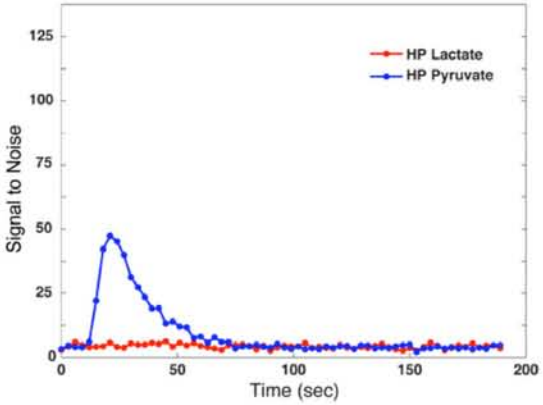
- *Detect lesion early*
  - Prostate Cancer: Early detection in humans using MRI and PET scans combined with TRUS-MR guided biopsy and intervention
  - Ovarian Cancer: Detect subvisible peritoneal implants using targeted optical imaging
- *Determine pathway*
  - C-MET: Investigating 2 imaging agents that target different epitopes of c-MET
  - HER2: human trial of radiolabeled Herceptin
  - Angiogenesis: Human trials of DCE-MRI and F-18 labeled RGD
- *Monitor for reactivation*
  - Prostate Cancer: PET and MRI for recurrence after “definitive” therapy
  - Lymphoma: FLT PET scanning for residual disease vs. scarring secondary to treatment (FDG positive lesions)
- *Intervene upon re-activation, before gross tumor recurrence*
  - Ovarian cancer: developing new targeted activatable perfusion/phototherapy treatments for subvisible lesions using optical markers to determine the presence of diseases
  - Glioma: Perform image guided convective enhanced delivery of therapy to the resection site of gliomas in order to intervene early before recurrence

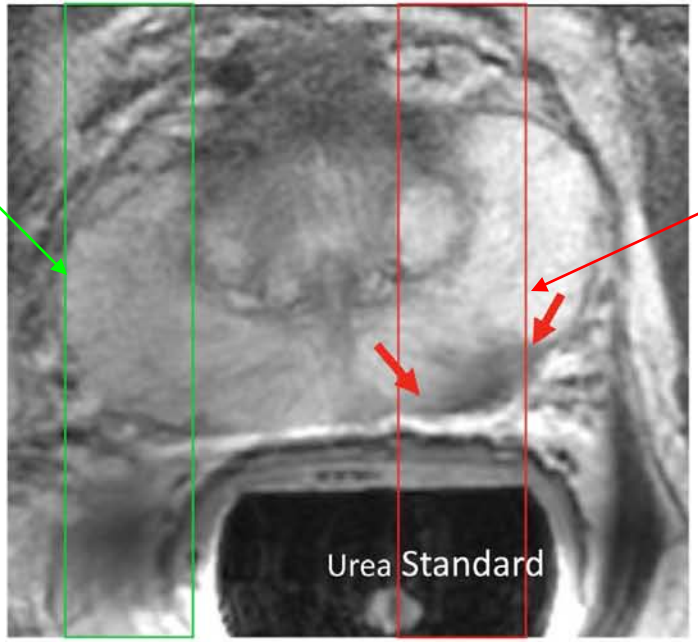
Pyruvate conversion in human prostate/ normal and malignant prostate tissue

Benign

36 Seconds After Injection



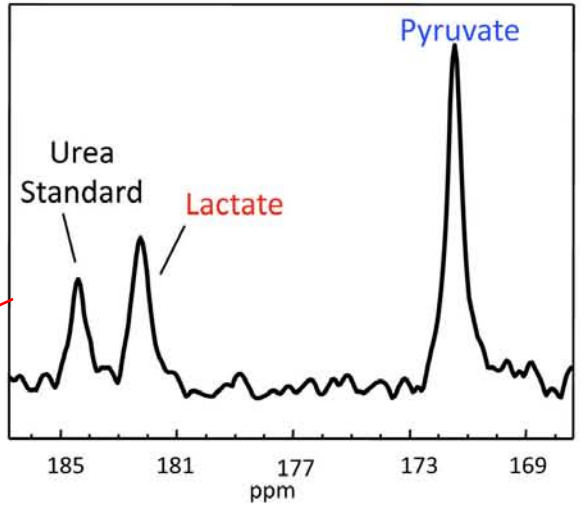


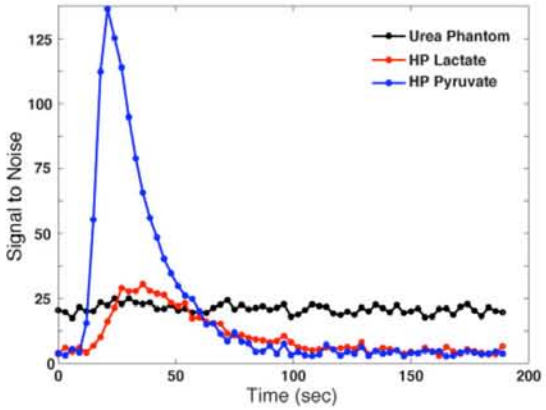


First Human Data:

Cancer

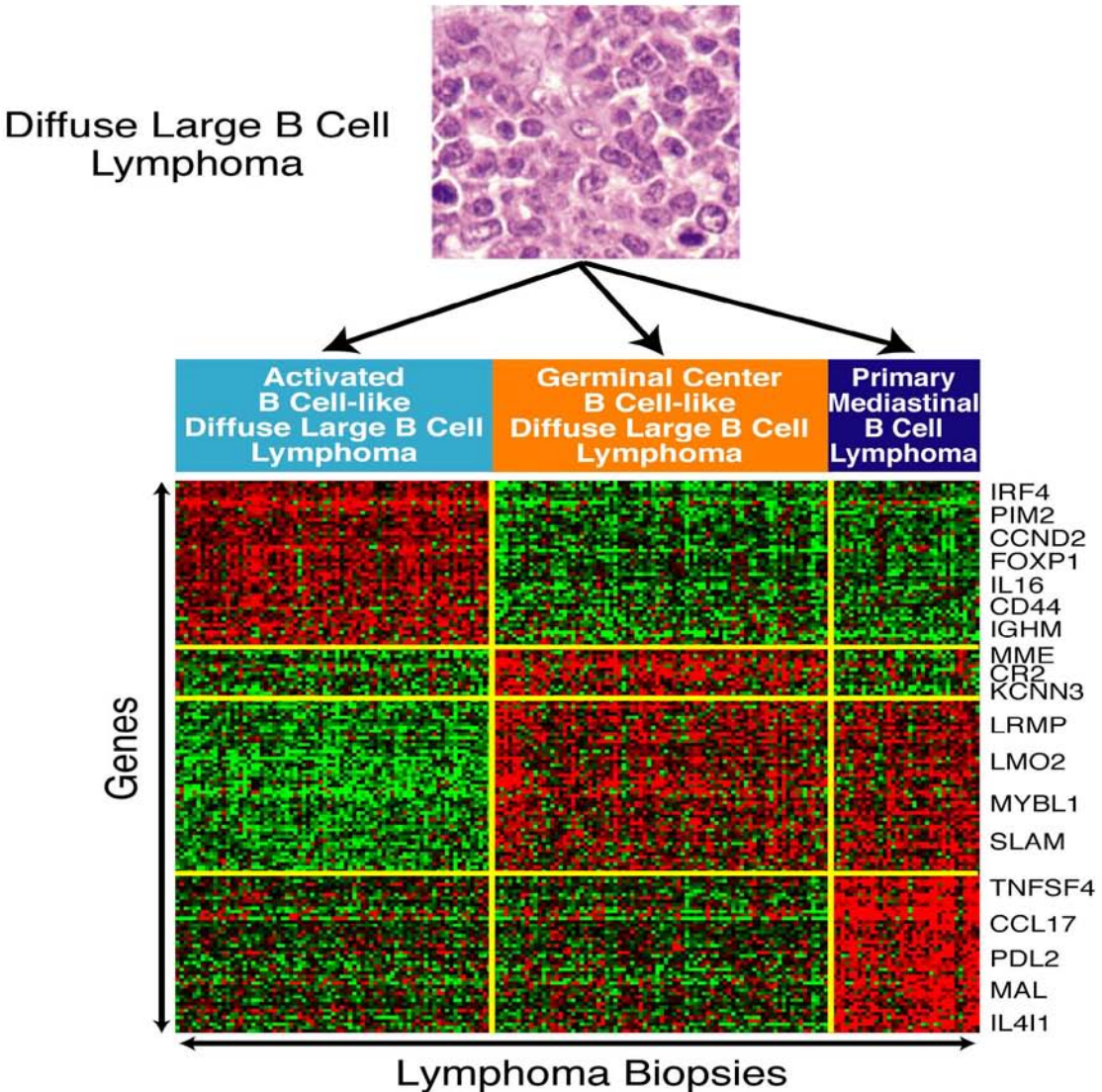
36 Seconds After Injection





Pyruvate is converted to lactate in malignant tissue.

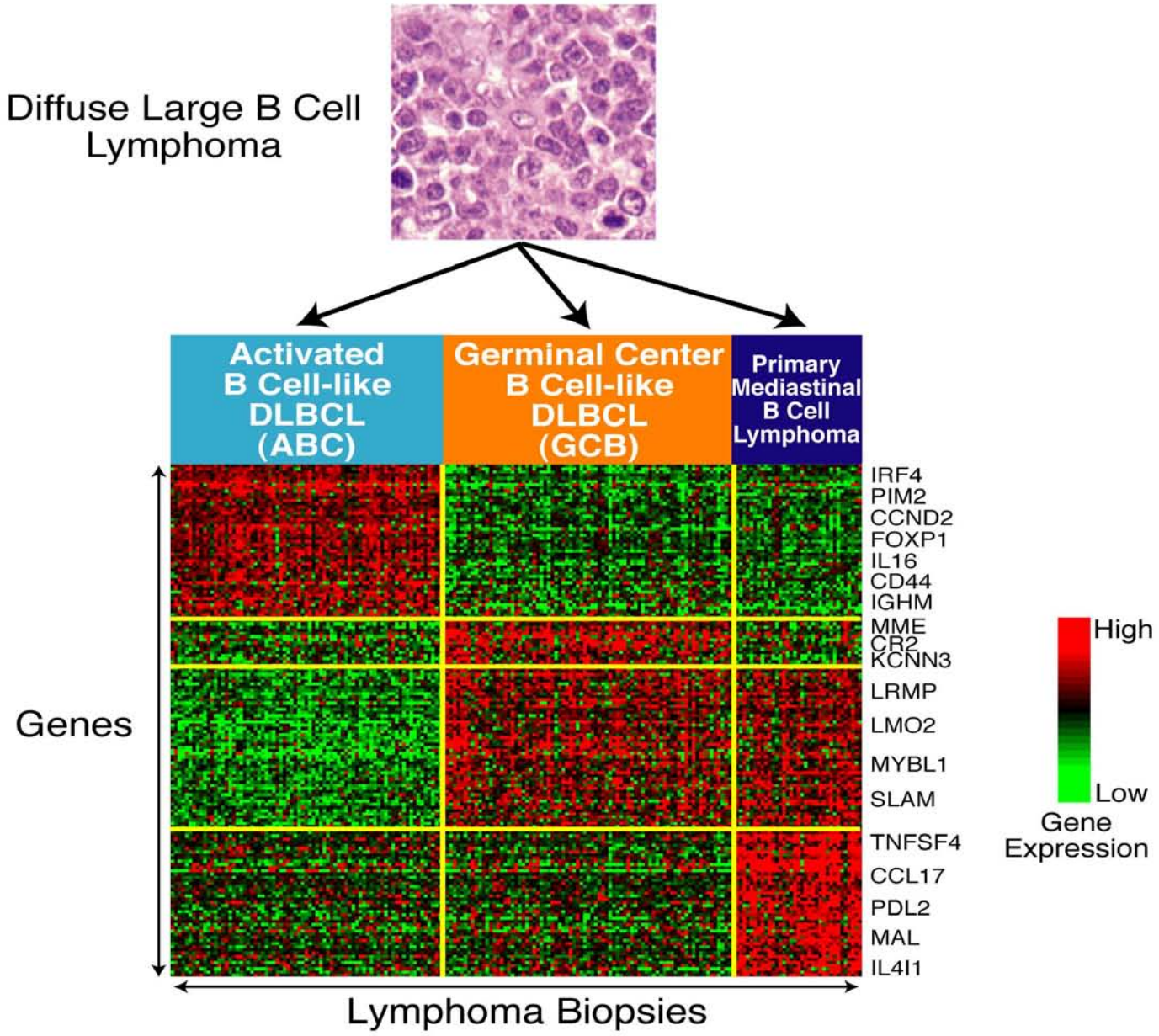
Development of a Diagnostic for Lymphoma Subgroups



Currently developing tests for diagnosis and prognosis of lymphomas in collaboration with NCI-Frederick

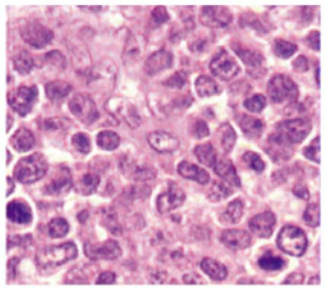
L. Staudt

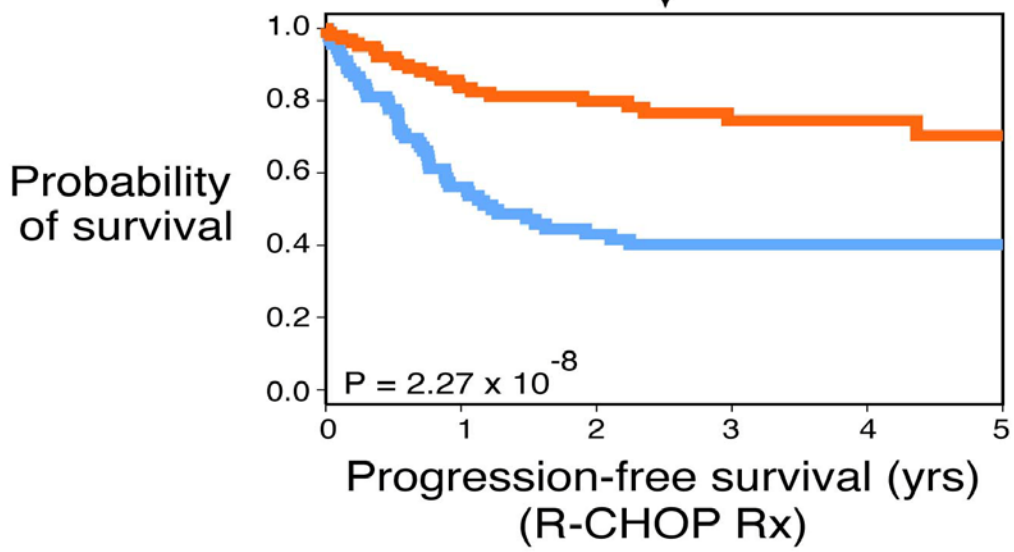
Dissecting Cancer into Molecularly and Clinically Distinct Subgroups by Gene Expression Profiling



Dissecting Cancer into Molecularly and Clinically Distinct Subgroups by Gene Expression Profiling

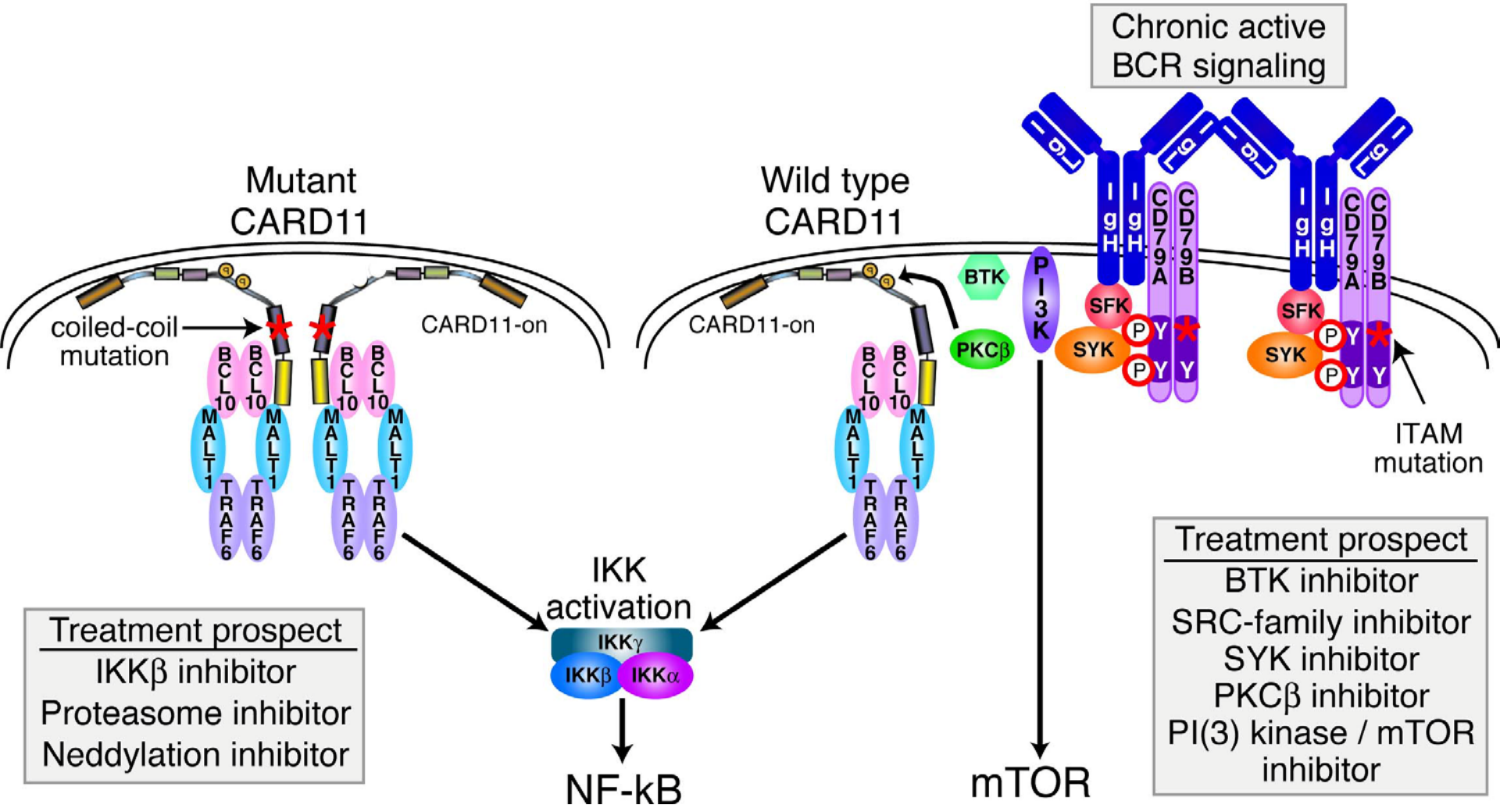
Diffuse Large B Cell Lymphoma





	3-year progression-free survival
GCB DLBCL	75%
ABC DLBCL	40%

Different Therapeutic Strategies for Subsets of ABC DLBCL Based on Characteristics of Mutations Activating NF-kB



Toward Personalized Medicine

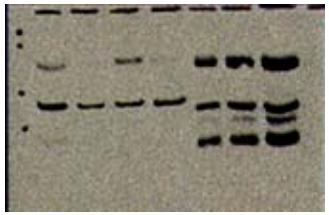
Put more science into clinical trials

Investigational drug

Responders

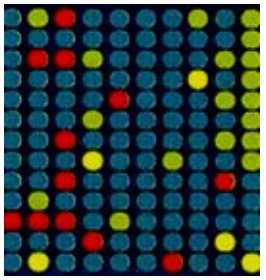
Non-responders

Pharmaco dynamic measurements



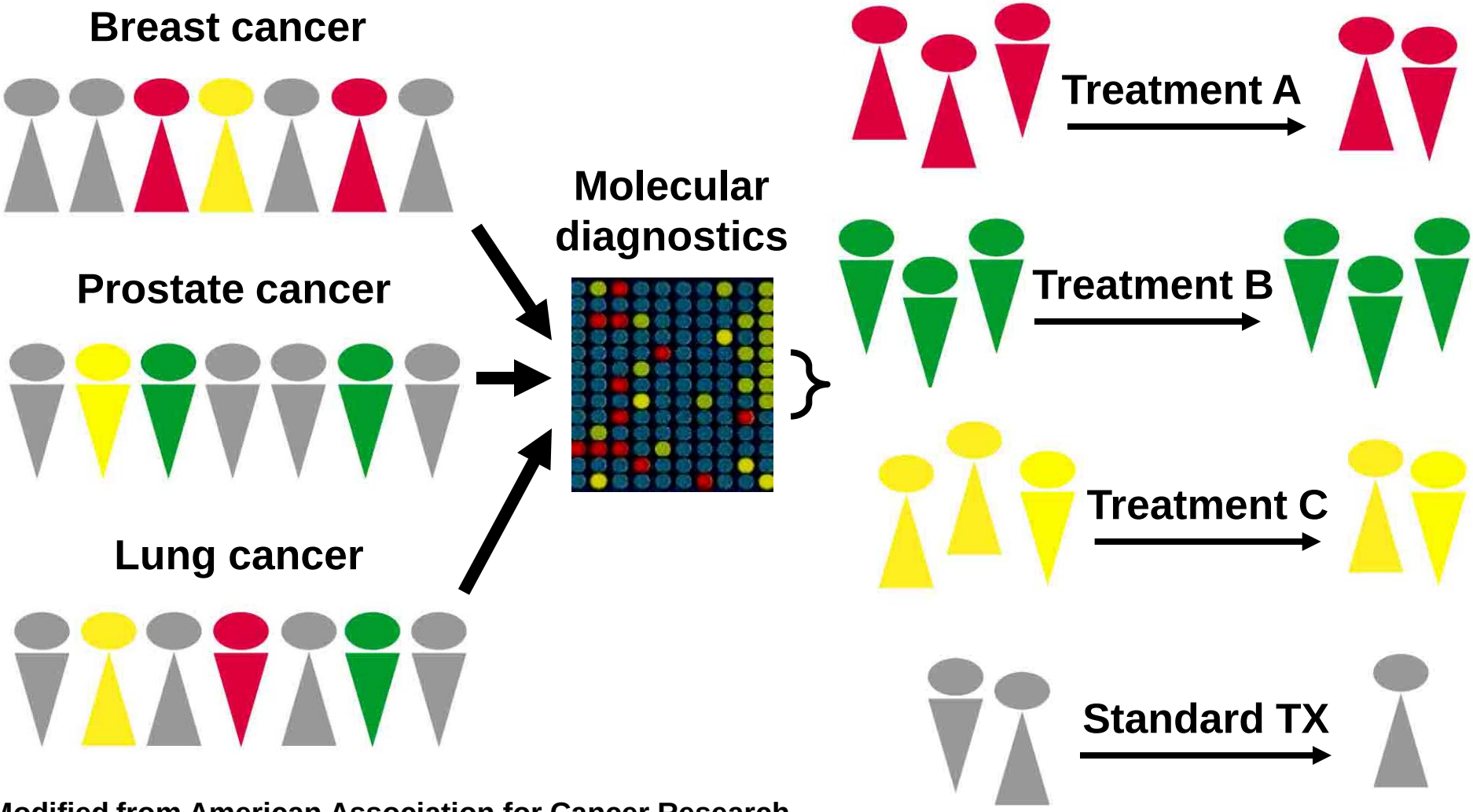
Molecular diagnostics: candidate approach

Molecular diagnostics: unbiased approach



Modified from American Association for Cancer Research

Individualized Medicine



Modified from American Association for Cancer Research

Approved Targeted Drugs

- Alemtuzumab (Campath)
- Arcitumomab
- Bevacizumab (Avastin)
- Bortezomib (Velcade)
- Capromab pendetide
- Cetuximab (Erbitux)
- Gefitinib (Iressa)
- Vemurafenib (Zelboraf)
- Ipilimumab (Yervoy)
- Gemtuzumab (Myelotarg)
- Ibritumomab tiuxetan (Zevalin)
- Imatinib (Gleevec)
- Rituximab (Rituxan)
- Tositumomab (Bexxar)
- Trastuzumab (Herceptin)